



NEW

CLAIMS

We claim:

- 5 1. A system for using outside ventilation air to maintain indoor comfort and air quality, comprising a means for air delivery, a means for dampering from two air sources, a means for sensing temperature, a means for interpreting sensed temperature to generate commands to control said system, and a means for accepting control parameters and using same to control the system;

10 said air delivery means supplies air to a building interior by means of a fan capable of variable speeds to circulate air within a building and to provide ventilation cooling;

said damper means directs a damper having at least two positions one of which positions causes said air delivery means to recirculate indoor air, and a second of which positions causes
15 said air delivery means to supply outside air to the indoor spaces and to release substantially the same volume of indoor air to the outdoors;

said sensor means includes an indoor temperature sensor and an outdoor temperature sensor, both for measuring air temperature;

20 said control means includes a single user interface and a controller;

said user interface and said controller are connected with the sensor means by a communication means which allows the controller and the interface to receive data from the sensor means;

25 said user interface includes buttons for establishing control settings;

said user interface allows the user to establish preferred minimum and maximum indoor temperature settings;

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1 said controller includes a microprocessor programmed with algorithms for predicting outdoor and indoor temperatures from temperature data obtained from said sensor means and from said minimum and maximum temperature settings;

5 said controller conveying said predictions to said user interface where they are graphically displayed and from which a user of said system can select settings that maintain a desired comfort level and minimize needs for cooling of the building interior using vapor compression-based air conditioning;

10 said algorithms calculate a ventilation low limit temperature which is greater than or equal to said minimum temperature setting and which increases with decreasing building cooling requirements to prevent over-cooling and determines the speed for said fan with energy use and noise a consideration;

15 said control means initiates said ventilation cooling operation by activating said air delivery means and by changing position of said damper means to said second position when the temperature sensed by said indoor sensor exceeds the temperature sensed by said outdoor sensor by a predetermined magnitude, and terminates said ventilation cooling operation when the temperature sensed by said indoor sensor falls below said ventilation limit temperature.

20 7. The system of claim 1, wherein said air delivery means and said damper means can be operated at the command of the user to either re-circulate indoor air or supply outside air.

12. The system of claim 1, wherein said air delivery means includes an air heating means selected from a furnace or heating coil for supplying warm air.

25 14. The system of claim 1, wherein said control means in cooperation with said air delivery means and said damper means cause a specified volume of outside air to be delivered to a building interior to maintain indoor air quality.

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1 16. The system of claim 1, further comprising an air cooling means selected from a compressor-based air conditioner condensing unit and evaporator coil, or an evaporative cooler.

25. A process for using outside ventilation air to maintain indoor comfort, to maintain air quality and to lessen energy use, comprising the steps of :

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- (a) circulating as necessary air to the interior of a building from at least two air sources controlled by a damper means;
- (b) measuring the temperature of the interior air and the temperature of the outside air and storing said measurements in electronic memory for a period of time to allow
- 10 calculations therewith;
- (c) communicating with the system through a single user interface which accepts settings for upper and lower temperature limits and a desired temperature;
- (d) calculating commands to control the timing of air circulation, the speed of a fan and
- 15 the source of air being circulated to and through a building by using a microprocessor that applies algorithms that use said stored measurements and said temperature limit settings to compute predicted next day maximum and minimum outdoor and indoor temperatures; and
- (e) controlling the system with a controller that carries out the commands calculated by
- 20 said microprocessor.

26. The process of claim 25, wherein controlling includes operation at the command of the user to either re-circulate indoor air or supply outside air to the system.

27. The process of claim 25, wherein controlling includes heating the circulated air with a

25 means selected from a furnace or heating coil.

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